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Original Communication

Review of traffic accident cases presenting to an adult emergency service in Turkey

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Abstract

Introduction: Traffic accidents cause the death of millions in the world each year. Learning about the characteristics of the casualties involved in such accidents, which constitute a very important health problem, is essential in terms of measures to be taken. They may have substantial humanitarian and economic impact.
Materials and methods: In this study, injured patients who had been involved in traffic accidents presenting to the adult Emergency service of Gazi University Hospital (Ankara, Turkey) in the 3-month period between 1st of March and 31st of May 2006, were examined, and review of a range of factors including the effects of age, gender, mode of transport to the hospital, type and regions of injury, time of injury, and presence of factors such as alcohol and alike was undertaken.
Findings: A total eight thousand and eight hundred patients presented to our emergency department within the study period. Two hundred and sixty-two (3%) of these patients were injuries sustained in crashes. 38.2% (100) of the patients were women, and 61.8% (162) were men. The most frequently presenting age group was the under-25 age group with 27.9%. The highest attendence in Emergency Medicine Departments due to crashes was the period between 18:00 h and 24:00 h, (34.4% (n = 90)). The most frequent presentations were of those of patients sitting in the front seats (driver or passenger) with 48.5% (n = 127). 60.3% (n = 158) of the injured were conveyed to the hospital by the ambulances of the national emergency call system. The great majority of injuries (54.9%, n = 149) were patients with multiple traumas- also involving the head and the neck regions. Alcohol levels were determined in 59.6% of the cases, and in 19 cases the alcohol level was found to be higher than the legal limit of 50 mg/dL. 1.1% (n = 3) of the injured cases died in the emergency service, 8.4% were hospitalized in relevant clinics, 0.8% were referred, and 89.7% (n = 235) were followed-up in the emergency room for various periods of time, and then discharged.
Conclusion: Traffic accidents constitute a very important health problem for the public health. Treatment of the injured individuals, and losses from the work force are significant for developing countries like our country. Studies directed towards the causes of traffic accidents will play a very important role in determining the measures to decrease or prevent such crashes.

Keywords: Traffic accident; Characteristics of injuries; Emergency service

1. Introduction

According to the data of World Health Organization (WHO), 1.2 million individuals died with causes related to traffic accidents, and 20 million individuals were either

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injured or left handicapped. Deaths related to crashes constitute 2.1% of all deaths, and is ranked 11th among causes of death.[1] The cost of these crashes to countries is 518 billion dollars. The financial impact of crashes to countries is about 1–5% of the national income of the country. Again, according to reports published, deaths related to traffic accidents will rise to the 3rd place among reasons causing mortalities in the year 2020 if no measures are taken.[2] Well, what is the situation in Turkey?

According to the statistics, a total of 570,429 traffic accidents occurred in Turkey in 2005, and 3215 individuals died in these crashes. A thousand individuals died in the 210,045 accidents occurring in the first 4 months of 2006, and 40,488 individuals were injured in the first 4 months of 2006. Thus 50 accidents occur per hour in Turkey, and one individual loses his/her life in these crashes, and 12 are injured. The annual loss to the economy of Turkey has been estimated at about 350–450 million dollars.[3–5]

The most important steps that should be taken include giving a good training to educate all sections of the society about traffic law and rules and coded determining the most frequent causes of crashes, organizing the emergency and first aid interventions on the spot well, and rendering the emergency services of hospitals adequate.[6]

Therefore, the results of all the studies on traffic accidents and the suggestions for solutions developed under the light of data obtained from these studies should be exposed as much as possible.

We also aimed at sharing the data we obtained by examining the traffic accident cases presenting to our hospital, in order to draw attention to the problem and assist in contributing to solutions.

2. Materials and methods

Total two hundred and sixty-two patients presenting with injuries sustained in traffic accidents between 1st March and 31st May 2006 to the Adult Emergency Service of Gazi University Hospital were included in the study. Age, gender, body regions of injury, hour of presentation, way of transport to the hospital, treatments performed, and blood alcohol levels were recorded. Data were incorporated into and analyzed in the computer using the SPSS 13.0 statistics package program. Distribution characteristics of the dependent variables were evaluated using the Kolmogorov-Smirnov and the Shapiro-Wilk tests. Chi-square and Fisher's exact tests were used for the evaluation of categorical variables. Level of statistical significance was accepted as $p < 0.05$.

3. Findings

A total eight thousand and eight hundred patients presented to our emergency department within the same study period. 13.6% (1200 cases) of all these admission were forensic cases. Among these forensic cases were falls, assaults, stabbings, gunshot injuries, suicidal attempts and traffic accidents. Traffic accidents constituted 21.8% of the forensic cases. Of the remaining 7600 cases, 59.1% (5200 cases) were medical and 27.3% (2400 cases) were surgical patients.

Two hundred and sixty-two (3%) out of 8800 cases presenting to the emergency service within the 3-month period covered by the study were cases of injuries related to crashes. The average age of the injured patients was 35.8 ± 14.3 years (17–79). The age distribution of the patients is given in Table 1.

38.2% (100) of the cases were women, and 61.8% (162) were men. 27.5% (72) were injured when they were outside the vehicle, 48.5% (127, 90 were the drivers) when sitting in the front seat, and 24% (63) when sitting at the back seat. While 93.1% (244) did not wear their seatbelts during crashes, 6.9% (18 cases, 12 were the drivers) put their safety belts on.

Presentations to our emergency service occurred between the hours of 18:00 and 24:00 with 34.4% presenting after crashes. Distribution according to hours is given in Table 2.

60.3% (158) of the patients were transported to the hospital with the 112 emergency call system, 39.5% (94) with their own cars, with the help of other cars passing by, or by taxi. 3.8% (10) of the patients were conveyed to the hospital with ambulances since they were referred from other hospitals.

A major site of trauma localized to one region was present in 71% of the patients. Body trauma regions of the cases and distribution of these according to number of cases are shown in Table 3. More than one body region had sustained trauma in 21.7% of the patients.

Vital signs and level of consciousness on presentation are given in Tables 4 and 5.

Intubation was not required for 96.2% (252) of patients. One patient was intubated during the follow-up in the

Table 1
Age distribution of the patients injured in crashes presenting to the emergency service

Age	#	%
⩽25	73	27.9
26–35	72	27.5
36–45	59	22.5
>45	58	22.1
Total	262	100

Table 2
Distribution of cases with injuries related to crashes, presenting to the emergency service, according to hours

Hour of application	#	%
00:00–05:59	39	14.9
06:00–11:59	60	22.9
12:00–17:59	73	27.8
18:00–23:59	90	34.4
Total	262	100

Table 3
Distribution of the body regions sustaining trauma related to the crashes

Major trauma site	#	%
Head	87	33.2
Thorax	15	5.7
Abdomen	4	1.5
Pelvis	13	5.0
Extremities	67	25.6
Head, thorax	6	2.3
Head, abdomen	6	2.3
Head, extremities	31	11.8
Head, pelvis	3	1.1
Head, thorax, abdomen	3	1.1
Head, abdomen, extremities	8	3.1
Unknown	19	7.3
Total	262	100

Table 4
Vital signs and consciousness states of the patients

Findings	#	%
Pulse rate (/min) 92.8 ± 17.7		
⩽60	5	1.9
61–100	181	69.1
>100	76	29
Respiration rate (/min) 19.2 ± 4.2		
⩽10	1	0.4
10–20	195	74.4
>20	66	25.2
Systolic blood pressure (mmHg) 116.3 ± 19.5		
⩽100	81	30.9
>100	181	69.1
State of consciousness (GCS)[a] 14.6 ± 1.7		
Conscious	231	88.2
Confused	23	8.8
Unconscious	8	3.1

[a] GCS: Glasgow coma score (3–15).

Table 5
Distribution of consciousness states of the patients according to GCS

Glasgow coma score	#	%
3–8 (Unconscious)	8	3.2
9–12 (Unconscious – confused)	2	0.8
13–15 (confused – conscious)	252	96
Total	262	100

emergency service, and nine patients were conveyed to the hospital by the 112 EMS in an intubated state.

Central catheters were not installed in 253 of the patients, and a central catheter was installed in nine (3.8%) patients with the purpose of hemodynamic monitoring during the follow-up. Tetanus prophylaxis was provided for 51.9% of patients (136), and prophylactic antibiotic treatment was administered to 51 (19.5%) patients because of their injuries.

The average hemoglobin value at presentation was 11.3 ± 6.1 g/dL. Hemoglobin follow-up was not performed in 72% of the patients. No fall in hemoglobin (fall in hematocrit values exceeding 10%) was observed during the hemoglobin follow-up in 59 out of 73 patients that hemoglobin follow-up was performed.

Blood alcohol levels of the victims of crashes were as follows: no blood alcohol test was performed in 74 cases (28.2%). Blood alcohol levels for 137 cases (52.3%) were either negative, or within legally allowed limits. In 32 cases (12.2%), the result of the examination was noted as ''no alcohol''. In 19 cases (7.3%), the blood alcohol level was found to be over the legal limit of 50 mg/dL. The average alcohol level in these cases was 190.21 mg/dL (73–387 mg/dL). Fifteen of the injured cases with high alcohol levels were drivers, and four were pedestrians.

Blood transfusion was administered to four patients, and volume expanders were used for six cases.

The existing problems related to trauma of 60.7% of the victims presenting to the emergency service were solved by the resident doctors and specialists of the emergency service, and no consultations from other disciplines were requested. For 39.3% of patients, however, consultations from other departments were requested. Consultation requests and the departments from which consultations were requested are shown in Table 6.

Plain X-rays were not requested in only four of the patients presenting to the emergency service following crashes. While all the plain X-rays (one-directional chest X-ray, two-directional cervical, two-directional thoracolumbal, pelvic, and two-directional extremity or joint X-rays) were requested in 127 of the remaining cases (48.5%), only two-directional cervical and one-directional chest X-rays were requested in 41 cases.

Abdominal ultrasound scan was performed on 54 cases in the emergency service, and pathologies were found in four. Abdominal CTs were requested in 18 cases, and abnormal findings were seen in 10 cases. Cranial CT was ordered for 75 cases, and cranial pathologies were seen in 21. Thoracic CTs were requested in 17 cases, and abnormalities were found in 11 patients. Diagnostic peritoneal lavage was performed by general surgeons and found to be normal in two cases. Extra imaging methods were

Table 6
Distribution of the consultations requested for the victims according to departments

Department from which consultations were requested	#	%
Neurosurgery	18	6.9
General surgery	2	0.8
Plastic surgery	13	5.0
Orthopedics	31	11.8
Cardiovascular surgery	1	0.4
Thoracic surgery	4	1.5
Plastic surgery and neurosurgery	10	3.8
Eye and plastic surgery	1	0.4
Neurosurgery, thoracic surgery, general surgery, and orthopedics	18	6.9
No consultations requested	159	60.7
Other (urology, psychiatry, ENT etc.)	5	1.8
Total	262	100

performed on 14 cases, four out of which were facial CTs, two were orbital CTs, four cervical CTs, and four thoracolumbal CTs.

8.4% of the cases (22) were hospitalized in wards, three patients (1.1%) died, two (0.8%) were referred to other centers, and 235 cases (89.7%) were followed-up at the emergency service and then discharged.

When the relation of the type of crash and the age group was considered, it was seen that pedestrian accidents were most frequently encountered in individuals under the age of 25, and front-seat traffic accidents were most frequently encountered in individuals between 26 and 35 years of age. This difference was statistically significant ($p < 0.05$). This difference can be attributed to the lack of economical independence and sufficient funds in individuals under 25 years of age in order to purchase a car, and the tendency of individuals between 26 and 35 years of age to purchase cars with increasing income and more independent economy. No age group showed a marked difference for the rear seats of cars.

In assessing the relation with the type of crash and gender, while no relationship can be found between pedestrian traffic accidents and crashes when sitting at the rear seat of cars, it is seen that the male gender is mostly affected in the front seat of cars ($p < 0.05$). This can be attributed to the still continuing dominance of men as drivers in our country.

When the relation with the type of crash and the time is considered, it is seen that pedestrian accidents are most frequently encountered between 12:00 and 17:59 h, and crashes when sitting at the front- or rear-seats of cars are seen most frequently between 18:00 and 23:59 h ($p < 0.05$).

In evaluating the relation with the type of crash and the body regions affected by trauma, it is seen that the most frequently affected trauma regions in pedestrian traffic accidents are the extremities with 44.4%, the head with 13.9%, and the head plus the extremities with 15.3%. The most frequently affected trauma regions in crashes when sitting at the front seat are the head with 48.8%, the extremities with 18.9%, and the head plus the extremities with 10.2%. Major trauma sites in the back seats of cars are the head with 23.8%, the extremities with 17.5%, and the head plus the extremities with 11.2%.

No statistically significant relation was found between the type of crash and vital signs (pulse rate, blood pressure, and respiratory rate).

No significant relation was found between the type of crash and the state of consciousness. However, there is a significant relation between the state of consciousness and major site of trauma. While the major site of trauma in five patients (62.5%) out of eight unconscious patients was solely the head region, the trauma was of a multiple type also involving the head region. While the major site of trauma in nine patients out of 23 (39%) with a confused state of consciousness was solely the head region, it was of a multiple type involving the head region, too. In the two hundred and thirty-one patients with full consciousness, the major trauma sites were the head, or multiple traumas involving the head region only in 57.2%.

Hemoglobin follow-up was performed for 73 out of 262 patients. Hemoglobin values decreased only in 14 out of this 73 during the follow-up. Nine out of 14 patients with decreasing hemoglobin values had multiple sites of trauma.

While only thirteen out of 231 (5.6%) conscious patients were hospitalized, eight patients out of 23 with a confused state of consciousness (35%) were hospitalized. One patient out of eight unconscious patients was hospitalized in the intensive care unit, three patients died in the emergency service, and two patients were referred to other centers due to lack of vacant beds. Two patients were observed for a long duration of time in the emergency service.

Seven patients out of 14 in whom hemoglobin values were followed-up and seen to have decreased, were hospitalized in the wards. Three patients died, two were referred to other facilities, and two patients were followed-up at the emergency unit.

Only 10 out of 186 (5.3%) patients with site of single trauma were hospitalized in the wards. One patient with a single trauma site (head) died in the emergency room. Twelve patients out of 57 (21%) with more than one major trauma site were internalized at the wards (5.3% vs. 21%, $p < 0.05$).

Two patients with multiple major trauma died in the emergency unit.

The speciality units to which patients were allocated were as follows: three patients in plastic surgery, four patients in thoracic surgery, six patients in orthopedics, six patients in the intensive care unit of general surgery, and three patients in the intensive care unit of neurosurgery.

4. Discussion

The World Health Organization and the World Bank have pointed out that traffic accidents, particularly in countries with low and medium income levels are a problem of public health. While, according to the data of 2002, deaths related to crashes in European Countries with high incomes is 11 per a hundred thousand, it is 26.8–28.3 per a hundred thousand in Eastern Mediterranean and African countries with low and medium income levels. However, the accuracy of the data from these countries is also questionable.[7]

The World Bank has reported an expected global increase in deaths related to traffic accidents in the next 20 years; however, this increase would be related to the increase in the number of crashes in countries with low/medium income levels. According to the estimates, while the mortality rates related to traffic accidents would decrease by 28% in countries with high income levels, it will increase by 92–147% in countries with low/medium income levels.[8]

Being a public health problem that is predictable and preventable, suggest that it can be solved by rational and planned approaches.

Traffic accidents are complex events arising from human, technical, and environmental factors.

Human factors point to many factors such as age, gender, consumption of alcohol, level of health, educational level, whether or not one is a driver, pedestrian, or riders of bicycles, motorcycles, whether or not one follows traffic rules, level of applying preventive measures like safety belts or helmets, level of attention, physical weariness, or psychological conditions.[9–17]

Technical factors are the factors that determine the risk and consequences of crashes like orderliness of the roads, orderliness of traffic lights and signs, presence of traffic police, frequency of controls on roads, illumination of the roads, maintenance and adequacy of the road network, presence or absence of separate bicycle paths and paths for pedestrians, presence or absence of barriers for limiting the speed of motor vehicles, soundness and reliability of the vehicles, etc.[16–19]

Environmental factors such as the angle of vision, hour of the crash, lighting conditions, season, bad weather conditions, and localization of the crash (in-city, rural, intersections, level crossing, etc.) also determine the seriousness of crashes.[16–19]

There are many diverse studies in the literature investigating the effects of the risk factors mentioned above on traffic accidents. In short, it has been shown in these studies that male gender, advanced ages, speeding and under the influence of alcohol, crashes in night hours, outside the city, in intersections and junctions, failing to put the safety belt on, and involvement of pedestrians and riders of bicycles and motorcycles pose a higher risk, mortality, and morbidity.[12–14,17,19]

According to our data in this study; male gender, under the influence of alcohol, not using safety belts, physical weariness and low level of attention were the most important factors for the causes and results of crashes.

We also know that speeding, low educational level, not following traffic rules, inadequate police controls on the inter-city roads, inadequate road networks, inadequate illumination of the roads, inadequate traffic lights and signs and seasons were also important factors for the accidents according to other studies performed in Turkey.

When we review our results:

Injuries related to crashes constitute an important ratio of cases presenting to emergency services. According to studies performed in Turkey, the percentage of casualties presenting to emergency units after crashes ranges between 1.94% and 44%. This range difference is related to the characteristics of the patients, closeness of the emergency service to main roads, presence of a trauma center, and availability of equipment and human resources capable of performing interventions on trauma cases.[20–22] This ratio for our center is about 3%.

Almost every city in Turkey has a community and/or university hospital. In bigger cities like Ankara, Istanbul or Izmir, the numbers increase up to even more than 3 or 4. There are even an equal number of private hospitals. The university hospitals are generally referral centers. After the calling system is initiated, the casualties from traffic accidents are usually transferred to community hospitals. If the scene of the accident is close-by, they may directly be transferred to an university hospital or the casualties may admit to the university hospital or private hospital by him/herself. That is why in big cities there is such a large disparity between various emergency departments.

The majority (61.8%) of the cases injured in crashes is male. This dominance of male has been attributed to the dominance of men among drivers, men being more aggressive drivers, and also dominance of men among drivers of commercial transport vehicles apart from private cars.[14,20–22]

According to the Turkish Traffic Law, which was put into force in 1983, the legal limit of blood alcohol is 50 mg/dL (0.5 promil) or less.[23] Driving with blood alcohol limits exceeding these values is prohibited, and is a crime. Fifteen cases out of 19 that we found with blood alcohol levels exceeding the legal limit were drivers. That is, blood alcohol levels exceeding the legal limit were found in 15 of the 90 drivers (16.7%) included in our study. One point that must not be overlooked here is the period elapsing after the accident to application to the emergency service, or the blood alcohol test. Another significant point is that there are fewer reports of individuals involved in accidents who had consumed alcohol, and there are lower numbers of presentations of victims of accidents with slight injuries, who had consumed alcohol. In addition, blood alcohol levels of both parties involved in the crashes must always be tested and recorded in order to avoid legal problems later. Decisions of ''have taken alcohol'' or ''no alcohol'' must not be made by physical examination, because 10–15% of cases that have been reported as ''having consumed alcohol'' with physical examination have alcohol levels under the legal limits, and this causes legal problems. Again, although the mouths of diabetics, those consuming large amounts of fruits, and users of mouth washers containing alcohol will smell of alcohol, their blood alcohol will naturally be low.[9,10,14,24]

What drives attention to our study, as well as other studies performed in Turkey, is that injuries mostly seen in young and middle-aged groups, which cause serious loss of work force in the society.[6,20–22]

The hours at which the injured individuals are brought to the emergency service are generally afternoon and evening hours. These periods corresponds to the time period that people actively work and travel, and then go back to their homes after finishing work. Increased number of vehicles in the traffic, and reduced attention of drivers and pedestrians related to the fatigue of the day; and failure to follow traffic rules and driving after taking alcohol in late hours, are the greatest causes of crashes.

Death or being left handicapped of the young and productive population due to traffic accidents are problems that are not easy to tolerate in developing countries with limited resources, including Turkey.

The entire world is sensitive with regard to traffic accidents. The United Nations have announced the World Health Organization (WHO) as the coordinator in 2004 for the safety measures on roads; and the WHO and the World Bank have published a declaration including proposals for the prevention of traffic accidents. In addition, it has been decided that ''United Nations Global Road Safety Week'' would be organized between the 23rd and 27th of April each year, starting from 2007, and that the third Sunday of November would be the ''Remembrance Day of Traffic Accident Victims''.[25,26]

Two important entities for the prevention of traffic accidents are measures and training. Teaching the traffic rules starting from very young age, reminding these rules frequently through the print media and other means of information with the purpose of reinforcing these rules, subjecting the drivers to training and courses to remove their lack of information, subjecting the professional drivers driving mass transport vehicles to health controls and psychological tests, and reminding individuals about the benefits of using safety belts and helmets, are included in these training activities.[6,7]

In the long term, improving the road networks and their quality, orienting the weight of traffic to other transport means outside the land route, producing more intelligent, more durable, and more reliable vehicles, constructing separate roads for bikers and pedestrians, taking measures for reducing speed on roads, performing more effective traffic controls, and giving more serious penalties for violation of rules, for driving with alcohol, and for causing deadly accidents, are among the first measures to be taken.[6,7,18,24]

5. Conclusion

Deaths, injuries and becoming disabled after traffic accidents bring great financial loads to the budgets of developing countries like ours. This problem should be solved as soon as possible before causing more deaths under the light of the studies on causes and prevention of traffic accidents and the support of the world-wide organizations.

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